PUBLIC HEALTH
General (Snowmobile Emissions Exposure)
COMMENTS: Not only is human health, including the health of park officials and snowmobilers compromised by exposure to such poisons, but these chemicals can adversely impact the fish, amphibians, mammals, birds, and vegetation in National Parks through acid rain, or when flushed into the aquatic system upon snowmelt. Human Health Risks Associated with Carbon Monoxide and NPS Responsibility to Protect Public and Employee Health: The blue haze found along snowmobile corridors, trailheads and gas stations contains not only dangerous levels of airborne toxins, but can lead to the formation of additional ground level ozone from the photochemical reaction of released nitrogen and hydrocarbons. Health risks associated with exposure to smog and nitrogen include respiratory complications such as coughing. Chest pain, heart problems, asthma, concentration lapses and shortness of breath. Elderly individuals and children are particularly sensitive to ground level ozone and nitrogen. In Yellowstone, concern about public health and excessive snowmobile pollution were issues raised in over 1,200 snowmobile complaint letters received by the park in 1993 and 1994. As a result, Yellowstone began to study snowmobile emissions and soon found that CO and PM concentrations were big enough to cause health and air quality concerns in West Yellowstone, along the snowmobile trail to Old Faithful, and in the parking log at Old Faithful (Park Service Air Quality Division 1995). In addition to adverse pollution impacts on visitors, Yellowstone has been forced to enclose ranger booths at its West Entrance to protect rangers from dizziness, nausea, fatigue, headaches, and breathing problems. Filtered air is pumped into entrance kiosks where rangers have reported difficulty counting change. Park visitors have reported tasting the visible haze which surrounds busy entrances and trailheads. Carbon monoxide is particularly dangerous because it binds to the hemoglobin in blood (forming carboxyhemoglobin) and renders hemoglobin incapable of transporting oxygen (Snook-Fussell 1997). Elevated levels of carboxyhemoglobin can cause neural-behavioral effects at lower levels (2-3 percent), headaches and fatigue (10 percent), and respiratory failure and death at higher levels. And the general consensus among medical professionals is that the health risk from CO increases at high altitude -- a risk exacerbated by richer fuel mixtures common at higher elevations. CO is particularly hazardous during pregnancy, and to the elderly, and children.
The National Ambient Air Quality Standards for CO of 35 ppm for 1 hour and 9 ppm for 8 hours were established to keep blood levels of carboxyhemoglobin below 3 percent. Notably, some scientists have criticized these standards because of evidence of adverse health effects even at these levels (Watson 1995, Greek and Dorweiler 1990).
SUMMARY RESPONSE: The recognition of health and welfare effects of the criteria pollutants, which include carbon monoxide, ozone, nitrogen oxides, particulate matter, sulfur dioxide, and lead, form the basis of the setting of the primary (health) and secondary (welfare) national, Wyoming, and Montana ambient air quality standards.
Facts or Data (Snowmobile Emissions Exposure)
COMMENT: While the DEIS indicates that studies have shown that exhaust emissions have been found deposited in the snow near roadways, no indication is presented that the levels of deposition are having any adverse impacts on streams or the surrounding environment.
RESPONSE: Unburned exhaust emissions from conventional snowmobile engines are not readily biodegradable.
COMMENT: Apparently your air quality sampling methodologies are wrong, thus bringing down the credibility and trust of the YNP officials.

PUBLIC HEALTH
RESPONSE: A variety of air quality sampling methods have been reported in studies by researchers at YNP to better understand air quality issues. In addition, comparative results from air dispersion modeling using EPA-approved models will be included in the FEIS.
SUMMARY COMMENT: Proper data supporting any drastic cutback in emissions must be supported by scientific data. Simply citing statistics for West Yellowstone's entrance stations isn't sufficient. Your numbers are based on old information and errant reporting of emissions produced by snowmobiles.
SUMMARY RESPONSE: An EIS is not, per se, a scientific analysis. The most recent engineering and scientific data were used in context of time and resources available. The results of additional technical analyses (e.g., air dispersion modeling) are to be included in FEIS.
COMMENT: For the most part, air quality is good and there is no evidence of people getting sick from air pollution, other than an occasional employee at West entrance. Presumably this situation could be mitigated by limiting exposure and by moving the check point out from under the enclosed entrance at West where fumes can be trapped.
RESPONSE: The DEIS cites over 1,200 visitor complaint letters received in 1993-94 relating to snowmobile emissions and results of preliminary carbon monoxide sampling conducted in 1996 that raised health concerns.
COMMENTS: There is an estimate that 60,000 dirty two stroke engines dump over 100,000 gallons of unburned gas and more than 2,000 gallons of raw oil into the soil of the park. It is estimated that the dirty two-stroke engines of the 60,000 snowmobiles that enter YNP dump over 100,000 gallons of unburned gas, and more than 2,000 gallons of raw oil into the park's environment.
SUMMARY RESPONSE: Estimates on the total quantity of gasoline and oil that are released as unburned fuel in the park is speculative.
COMMENT: Australian research companys (sic) as well as a German company have invented direct injection snow mobile 2-cycle engines that put out 75% less pollution emissions than the present ones.
RESPONSE: The emergence of cleaner burning two-stroke snowmobile engines is notable. However, the extent of emissions reductions and the timing of introduction into commerce in large numbers are unknowns.
COMMENT: Snowmobilers, rangers and other park visitors are exposed to dangerous levels of CO. In Grand Teton National Park, Fussell-Snook (1997) measured the amount of CO emitted from a snowmobile on a Park trail under steady-state conditions. An average of 9.9 g/mile (99 g/hr) to 19.9 g/mile (795 g/hr) of CO was emitted by one snowmobile traveling from 10 to 40 mph. By comparison, an automobile emits 0.01 to 0.04 g/mile of CO under steady-state conditions, or approximately 1,000 times less than a snowmobile. The average CO measurements for a single snowmobile, recorded at different speeds and distances (25-125 feet), ranged from 0.5 - 23.1 ppm. The Montana state one-hour human exposure limit for carbon monoxide is 23 ppm.

PUBLIC HEALTH
RESPONSE: The NPS is familiar with the reference cited, which is also listed in the Bibliography of the DEIS.
COMMENT: It is important to reemphasize that these measurements were based on a single snowmobile only, during steady-state conditions. Unfortunately, snowmobiles travel in packs of 2-25 units for sustained periods of time, and often accelerate over hills and banks. It is therefore clear that typical human exposure to CO is of a much greater magnitude, and represents a very significant level of toxic pollution. The results are particularly alarming for rangers and recreationists at trailheads, gas stations, and park entrances, where one hundred snowmobiles can create the equivalent carbon monoxide of more than 100,000 cars.
RESPONSE: Additional technical analyses (e.g., air dispersion modeling) will make assumptions about the number of snowmobiles that enter on average and peak days, and results will be reported in the FEIS.
COMMENT: As a federal employer, the NPS has the responsibility under OSHA and regulation to protect employee health. The Park Service also must perpetuate conditions in the best interest of public health. The permission of snowmobile use in the parks and concomitant impacts to air quality endanger park visitors with respiratory and other ailments and chemical sensitivities. The Park Service must provide a health environment for visitors; current snowmobile use precludes the parks' ability to ensure a clean, healthy environment for visitors and a healthy workplace for employees, as required by law.
RESPONSE: As noted on page 3 of the DEIS, Executive Order 11644, as amended, provides direction for permitting snowmobile use in national parks in the context of affecting natural values.
COMMENT: Page 93, Public Health, first sentence, "...increase in number of visitors...." A similar analysis is needed for the increase in snowcoaches. All the statements used to describe snowmobile emissions also apply to this type of snowcoach. For example, pre-1971 Bombardier model snowcoaches that comprised 100 to 85 percent (10 years ago to present) of all snowcoaches in Yellowstone emit much more HC, CO, and NOx than current automobiles or light trucks. These machines average 5 to 7 miles per gallon of gasoline. EPA records indicate this type of engine (pre 1971, no emission controls) emits about 1,000 grams per mile CO for the speeds traveled in the Park.
RESPONSE: Additional technical analyses (e.g., air dispersion modeling) to be included in the FEIS include modeling emissions from snowcoaches.
SUMMARY COMMENT: The public health and air quality sections in this DEIS really confuse ambient air quality standards and issues with personal exposure level standards and issues. These are really separate issues and need to be treated separately so that the appropriate agencies can act to resolve them. Also, the NAAQS and MAAQS were not exceeded. The NAAQS establish not just a concentration, but they also identify the monitoring methodology and the averaging time. While there is work indicating that levels above 35 PPM CO occurred for a short period at points in the park, the data referenced here are comparable to personal exposure limits (OSHA is 50 ppm CO). Personal exposure limits were not exceeded.
SUMMARY RESPONSE: References to ambient air quality standards and OSHA standards will be clarified in the FEIS.

PUBLIC HEALTH
COMMENT: Page 94, last paragraph, first sentence "Table 9" should be changed to Table 10. Both tables 9 and 10 inaccurately attribute all emissions to snowmobile traffic by listing only snowmobiles at the top of the columns, and do not include snowcoach and other vehicles. No background reading is given to account for pollution that may be coming from other sources like wood stoves or vehicles in the town. The University of Denver report also shows that snowcoach emissions are also high compared to other vehicles with 4-stroke engines. The table should be changed to include columns for snowcoaches and other (non-recreational) vehicles.
RESPONSE: Page 94, last paragraph – "Table 9" should read "Table 10". Column headings also will change.
COMMENT: The National Ambient Air Quality Standard for acceptable particulate matter is 65, not 60 as stated by the NPS. The particulate figures reported by the NPD were based on a four-hour exposure sample instead of the 24 hour standard. The NPS also mislead the public by grossly exaggerating the amount of poly-cyclicoromatic hydrocarbons (PAHs) in pounds instead of micrograms. The actual amount PAHs emitted is approximately .000543 pounds. This is huge error and clearly demonstrates the NPS apparent purposeful misrepresentation of the actual park air quality.
RESPONSE: The NAAQS for PM is noted to be 65 $\mu g/m^3$ in Table 14 of the DEIS. The DEIS acknowledges that two-stroke engines produce polycyclic aromatic hydrocarbon (PAH) emissions, but the number cited in the comment for PAH emissions could not be found in the DEIS.
COMMENT: "Most importantly, the DEIS fails to identify the largest variable in the air quality equation---climate at specific locations. Kado's 1999 draft final report illustrates that the West Entrance is the hot spot for Yellowstone's carbon monoxide and particulate matter sampling because of the high levels reported there compared to other sites. For another example, one street comer at a location near Yellowstone National Park has 250 times its annual average number of vehicles pass the intersection in the summer season without any deterioration in air quality. However, that same comer in the winter will have one-eighth (1/8) of its annual average annual vehicle count approach the National Ambient Air Quality Standards for carbon monoxide. The difference is the weather and dispersion of emissions." See Montana DEQ Comments.
RESPONSE: The air dispersion modeling that has been conducted for the FEIS is based on winter meteorological data.
COMMENT: An SAE paper presented in September 1998 and May 1999 detailing the ISO snowmobile procedure (used at SWRI) with a comparison to other engine test protocols (EPA, MMA, SA-E J- 108 8)" is more accurate and 3L4 should be reviewed in the DEIS." Over $250,000 went into development of this procedure. The real difference in emissions is how the engine is used in the field.
RESPONSE: Air quality analyses in the DEIS are not based on developmental snowmobile engines and/or test procedures that may or may not represent future technology scenarios.

PUBLIC HEALTH
New Information (Snowmobile Emissions Exposure)
COMMENT: The findings of these studies also correlate to studies on snowmobile emissions. In a study of snowpack contamination by snowmobiles, for example, Matthew R. Graham of the University of Nevada-Reno found elevated readings of four PAHs -- acenapthene, acenaphylene, napthalene and phenanthrene -- in snow samples under field conditions. Graham detected levels of napthalene, for instance, of up to 12,000 ppb. According to the Occupational Safety and Health Administration (OSHA), the short-term human exposure limit (STEL) for napthalene is 15,000 ppb. OSHA's Health Hazard Data indicates that "contact may cause skin or eye irritation ... inhalation may cause headache, nausea and perspiration ... [and] ingestion may cause cramps, nausea, vomiting and diarrhea" (OSHA, 1996). The lowest published lethal human oral dose is 50,000 ppb.
RESPONSE: Although two-stroke engines produce polycyclic aromatic hydrocarbon (PAH) emissions, the data cited on PAH refer to concentrations in snowpacks. The exposure thresholds noted also compare data on inhalation (e.g., STEL) to oral dose concentrations.
COMMENT: Dangerous levels of carbon monoxide (CO) and particulate matter (PM) are a primary concern. CO is extremely dangerous to humans (discussed below), and particulate matter is a recently confirmed human carcinogen by the Environmental Protection Agency. Snowmobiles emit dangerously high levels of carbon monoxide. A study conducted for the National Park Service in 1997 concluded that a single snowmobile produces 500-1000 times more carbon monoxide than a 1988 passenger car (Fussell-Snook 1997). Notably, comparisons to a current model-year passenger vehicle would increase this figure significantly.
RESPONSE: The DEIS acknowledges relatively high emissions associated with two-stroke engines compared to four-stroke engines.
COMMENTS: We actually compared ten snowmobiles burning synthetic oil with ten snowmobiles burning regular oil. And a crude estimate is there's probably a 75 percent improvement in the amount of smoke you get, visible smoke you get. Work by Castro, Rotax Engine Company, and several European universities showed that highly biodegradable, bio-based lube oils maintain over 80 percent of their biodegradable characteristics after being emitted from the engine exhaust, whereas emissions generated from partial combustion of conventional, non-synthetic, mineral lube oils increase their persistence. Over 86 percent of the emissions from Castrol's engine oil (Rotax biodegradable synthetic) were biodegraded within 50 days at 1 degree Celsius, compared to less than 3 percent for conventional fuel and lube oil emissions. The data were collected on projects in England and Germany using an ISO/ANSI method with water at 1 degree Celsius (to acquire European environmental certification). Once aware of the study results, NPS initiated the use of biodegradable lube oils. The use of biodegradable, low-emission lubrication oils for 2-stoke engines should be required of all fleets and permit holders in the parks. We recommend that their use be encouraged in private vehicles.
SUMMARY RESPONSE: The DEIS acknowledges improvements of synthetic lubricating oil on emissions, and the NPS snowmobile fleet currently uses synthetic lubricating oils.
COMMENT: I'm sure you are aware of the new direct fuel injecting that is on the near horizon for snowmobiles, this will make them run significantly cleaner than they do now, however I'm still not aware of any accurate data that can suggest that at present levels there is any harm being done.

PUBLIC HEALTH
RESPONSE: The NPS is aware of developing technologies that may reduce emissions from snowmobiles. For example, early this year, a university team won the SAE Clean Snowmobile Challenge 2000 with a four-stroke engine that also greatly reduced hydrocarbon emissions compared to a control sled. However, these developments are experimental and are not in commercial use.
COMMENTS: The Montana DEQ now monitors the West Entrance of Yellowstone National Park. Monitoring results from February 1999 show that the MAAQS 8-hour average standard for CO (of 9 ppm CO 8-hour average) was approached. These standards could be exceeded at any time, but to date, the standards have not been exceeded. Air quality data was only collected at the West Entrance and along the West Yellowstone, MT to Old Faithful corridor and at the West Entrance air samples were collected for only 4 days. It has been suggested that radio transmissions from the West entrance altered the air quality monitors and the readings at that entrance. No attempt was made to determine what component of air pollution was due to wood stoves and fire places versus snow machines and none of the data collection practices were reviewed by peer groups in that field. Even with these errors, the air quality at the West Entrance was never shown to be worse than the federal air quality standards and only exceeded Montana's standards during the morning hours (8-10 am) when the YNP shows that about one-third of the daily traffic volume entered Yellowstone National Park.
SUMMARY RESPONSE: The Montana Department of Environmental Quality operates a monitoring station for carbon monoxide near the west entrance and a monitoring station for particulates in the Town of West Yellowstone. In 1999, the maximum 8-hour reading at the Montana Department of Environmental Quality monitoring station was 8.9 ppm, and the second highest reading was 5.0 ppm. These readings compare to the 8-hour federal and Montana ambient air quality standard of 9 ppm, which is based on the second highest reading. Therefore, the highest 1999 reading of 8.9 ppm approached the 9 ppm standard, but the second highest reading of 5.0 ppm, which is used to compare to the standard, is well below the standard.
COMMENT: This entire table and section should be replaced with a summary of Dr. Norman Kado's September 1999 draft final report regarding exposure levels of mechanics, kiosk employees, and patrol rangers. The measured concentrations should be compared with the applicable federal limits for comparison (50 PPM).
RESPONSE: Dr. Kado's draft report was not available at the time the DEIS was prepared, but will be noted in the FEIS.
COMMENT: State officials have observed during routine trail inspections the past two winter seasons in the Gallatin Canyon that snowmobilers, nearly all non-residents, are traveling north along the highway from the Taylor Fork area. This is a termination point along the Big Sky Trail. Snowmobilers normally trailer their machines in and out of the Taylor Fork area. These snowmobilers are actually traveling on the highway surface or on the shoulder of the pavement to reach their destination, Big Sky resort, and then return to West Yellowstone via the same route. This situation is already dangerous and may become even more hazardous to the normal highway traffic and that of the snowmobilers if the preferred alternative is selected. This statement relates directly back to comments provided for the Greater Yellowstone Coordinating Committee document and Scientific Methods and Data.
RESPONSE: The NPS is concerned about public safety outside the parks. As an example, Grand Teton National Park personnel respond to winter accidents involving snowmobiles and other vehicles on Togwotee Pass. NPS asked all cooperating agencies to provide assessments of impacts on adjacent lands and jurisdictions.

PUBLIC HEALTH
These assessments are disclosed in the DEIS on pages 298-315. In particular, for Montana, this point is made on page 311. It appears that the situation involving travel from West Yellowstone to Big Sky and Taylor Fork and the return trip is hazardous regardless of any management decision by NPS.
COMMENTS: Most of the high readings of carbon monoxide reported by NPS have been in close proximity to the West Entrance kiosk. A review of the NPS 1995 study data shows that the kiosk station slows air speeds much as a snowfence slows and traps snow. This slowing or stopping of air movement traps emissions around the kiosk. The situation is similar to what occurs at tollbooths, and the entrance kiosk fit's EPA's definition of a tollbooth . Tollbooths with high concentrations of pollutants have reduced concentrations 35 to 73 percent by removing the roof connections between toll stations. Similarly, if the roof to the West Entrance kiosk were removed, air flow around the kiosks would be increased and vehicle emissions would be more easily dispersed. This has been discussed with Park Service personnel a number of times including an analysis in a letter from one of the engineers involved in the winter use studies in August 1997 with respect to improving the ventilation air for the kiosk workers. Two potential management changes to improve air quality at the entrance were discussed at the West Yellowstone Winter Use meeting in early 1997, but are missing here. The first would be to move the winter entrance station 1 to 2 miles farther into the Park where air flow conditions are better. The cost was estimated at less than $500,000, and industry representatives expressed interest in helping pay for this new entry station. If the entrance were permanently moved, air quality would also improve for summer employees and visitors. Another management technique that is being evaluated but is not discussed is the increased use of express lanes. The use of these lanes would not disrupt traffic flow, would decrease rider and employee exposure to emissions, and would eliminate emissions resulting from idling engines waiting in line. These two different management strategies need to be discussed in this DEIS, and considered as simple solutions to both ambient air quality and personal exposure concerns.
SUMMARY RESPONSE: These suggestions are good regarding facilitating air dispersion in the kiosk area at the West Entrance, but they do not represent the final solution to air quality problems The park is incorporating moving the entrance station as a mitigating measure in one of the alternatives The kiosks serve multiple purposes for the park and its visitors. For example, they may be the first contact points between park personnel and visitors where information on safety, current conditions, orientation, and other topics are shared. The existing roof over the kiosks serves several functions, including protection against inclement weather for visitors conducting transactions with park employees and serving as an architectural symbol that the visitor has arrived at the historic park.
COMMENTS: Public Health, Page 177, paragraph 5, last line: The paragraph should specify that only NPS and West Yellowstone rental operators use both these products. Only 5 to 6 percent ethanol blend in gasoline fuel was estimated to be used at the West Entrance in the morning (Morris, Bishop, Stedman, 1999). Yet, this produced a seven percent reduction in CO tailpipe emissions. The amount of ethanol blend in rental snowmobiles and snowcoaches is reduced from 10 percent by the amount of fuel purchased inside the Park because Yellowstone Park Service Stations, an NPS concession, do not carry 10 percent ethanol blend. If emissions are a concern why isn't ethanol gas sold in the park year round? Will idling buses in cold weather improve the air pollution?
SUMMARY RESPONSE: The DEIS includes actions to sell only 10 percent ethanol blend fuels for snowmobiles and snowcoaches in the parks beginning in 2002-2003 in Alternatives C and D.
COMMENT: The DEIS inappropriately tries to minimize this safety record by stating that there have been several injuries and one fatality near Togwotee Pass on the CDST/US287. This is an inappropriate comparison and is in an area outside the scope of this DEIS, and therefore this comparison should be eliminated.

PUBLIC HEALTH
RESPONSE: The NPS is concerned about public safety outside the parks. For example, Grand Teton National Park personnel respond to winter accidents involving snowmobiles and other vehicles on Togwotee Pass. The sentence noting several injuries and one fatality outside the park involving snowmobiles and automobiles is an observation regarding past experience in the immediate area outside of the park. No comparisons are drawn regarding safety implications of the DEIS alternatives.
Clarification
COMMENT: Air quality data was only collected at the West Entrance and along the West Yellowstone, MT to Old Faithful corridor and at the West Entrance air samples were collected for only 4 days. It has been suggested that radio transmissions from the West entrance altered the air quality monitors and the readings at that entrance. No attempt was made to determine what component of air pollution was due to wood stoves and fire places versus snow machines and none of the data collection practices were reviewed by peer groups in that field. Even with these errors, the air quality at the West Entrance was never shown to be worse than the federal air quality standards and only exceeded Montana's standards during the morning hours (8-10 am) when the YNP shows that about one-third of the daily traffic volume entered Yellowstone National Park.
RESPONSE: The Montana Department of Environmental Quality (DEQ) operates a monitoring station for carbon monoxide near the west entrance and a monitoring station for particulates in the Town of West Yellowstone. In 1999, the maximum 8-hour reading at the Montana DEQ monitoring station was 8.9 ppm, and the second highest reading was 5 ppm. These compare to the 8-hour federal and Montana ambient air quality standard of 9 ppm, which is based on the second highest reading.
COMMENT: The section on public health includes the sentence, "Violation of national standards did not appear to occur under these conditions because the siting criteria used to determine compliance with National Ambient Air Quality Standards (NAAQS) were written to deal mainly with interstates and other roads where people do not congregate on the road itself (Snook-Fessell 1996)". That sentence should be explained because it seems to suggest that the author pre-supposed that violation of standards had occurred and that the inability to document a violation somehow implicated the standards, rather than suggesting the lack of a violation.
RESPONSE: This sentence will be revised.
COMMENT: Snowmobile emissions is and ought to be an important issue in this DEIS. Given the information, or lack thereof, in the Snowmobile Emissions Exposure, the DEIS should document the degree to which the present condition for air quality constitutes a problem.
RESPONSE: Snowmobile emissions and air quality impacts were acknowledged as important issues in the DEIS, and additional air quality analyses will be conducted for the FEIS.
COMMENTS: It has been reported in the news that the Park Service Officials testing of snowmobile emissions was conducted to make it look like the amount of emissions emitted by snowmobiles was greater than it actually was.

PUBLIC HEALTH
Page 2, Table 1, item 5: The table lists emission factors "Polaris 98 Rich" but does not explain this test's importance to managers. NPS should provide this explanation for their management. The "Rich" test shows that snowmobiles need to be properly set-up and jetted for the elevation and climate where they will be operated. The "Rich" test was conducted to simulate emissions and performance of a snowmobile that is jetted for a lower elevation, like Minnesota, but used in Yellowstone without re-jetting-a situation that does occur regularly in Yellowstone.
SUMMARY RESPONSE: The NPS did not conduct emission testing of snowmobiles. The analysis in the DEIS relied on the most recent engineering and scientific data in the literature.
COMMENT: Page 93, first sentence after Table 8: The sentence may refer only to the setting of national standards, but does not reflect the method used in Montana. The Montana standard was based on an epidemiological evaluation conducted by the State during 1979-1980.
RESPONSE: The sentence will be clarified.
COMMENT: "Page 3, second paragraph, second sentence, "...snowmobile emissions increase with an increase in speed..." This statement is misleading because the highest production of emissions is at idle. White (1998) showed that the hotter the engine is, the lower the emissions--emissions are a factor of engine speed and torque, not snowmobile speed, as indicated in the NPS report."
RESPONSE: Engine speed and other parameters effect emission production in different ways. For example, carbon monoxide emissions generally are produced at higher rates when the engine is cold, while nitrogen oxide emissions are produced at higher rates when an engine is hot. The sentence will be clarified.
General (Public Health - Snowmobile Emissions Exposure)
COMMENT: The issue of human health identified in the scoping is missing from this Desired Condition. Studies have shown aerobic exercise such as nordic skiing are highly beneficial to human health. Cardio-vascular disease is the leading cause of premature death in America, according to the CDC. Desired conditions should include statement on the health benefits of human powered winter use activities.
RESPONSE: The general topic of exercise as beneficial to general health is not a focus of the DEIS.
Analysis (Public Health - Snowmobile Emissions Exposure)
COMMENT: Second, air pollution sensors measure differently between summer and winter, temperature and humidity have a tremendous effect to the sensors.
RESPONSE: In general, air monitoring methods prescribe the use of constant temperature housings for the instrumentation to preclude temperature and humidity fluctuations from affecting sampling readings.
COMMENT: Third, a single gallon of gasoline creates "x" amount of pollution regardless whether it is burned in an automobile or snowmobile, so how can a snowmobile produce 50 times greater pollution than a car?

PUBLIC HEALTH
RESPONSE: Emission production is not a direct function of gasoline consumption. Gasoline is burned much more efficiently in automobile engines than in two-stroke snowmobile engines. In addition, automobiles are designed with emission controls, while snowmobile engines are not controlled.
COMMENT: Have we factored the cost of their future health problems into the park entrance fee for snowmobilers?
RESPONSE: No.
COMMENT: However, they did not directly address the issue of limiting the numbers of snowmobilers entering the areas.
RESPONSE: Determining recreation carrying capacity is a feature of all alternatives, as discussed on page 25 of the DEIS. Such determinations are complex tasks that can take a great deal of time and public involvement. In order to mitigate impacts of vehicle numbers in the interim, several alternatives will incorporate interim use limitations as choices for the decision maker.
COMMENT: The EIS provides no data comparing automobile emissions with that of snowmobiles.
RESPONSE: Gasoline is burned much more efficiently in automobile engines than in two-stroke snowmobile engines. In addition, automobiles are designed with emission controls, while snowmobile engines are not controlled.
COMMENT: I don't think that at this time enough research has been done to set standards, whether it be on decibel or pollution levels on two-stroke engines or the possibility of four-stroke engines on over-the-snow vehicles, primarily the snowmobiles.
RESPONSE: The U.S. EPA has been investigating emissions from snowmobiles, but research on emissions from these recreational vehicles is not very extensive to date.
COMMENT: NPS should check on pollution level of cars.
RESPONSE: Emissions from automobiles are much better characterized than those from snowmobiles.
COMMENT: Implementation of reduced emissions is too slow, speed up the process.
RESPONSE: Air quality problems are mitigated in part by reducing the numbers of oversnow vehicles. This would be an interim measure, pending a long term visitor carrying capacity study. Air quality impacts are not reduced sufficiently by cleaner fuels and lubricants since the number of oversnow vehicles are not limited. In order to mitigate impacts of vehicle numbers in the interim, several alternatives will incorporate interim use limitations as choices for the decision maker.

PUBLIC HEALTH
COMMENTS: It is a surprise that the phasing and implementation of sound and emission standards should take 10 years. Why wait until 2008 to enforce stricter laws on emissions? I applaud the fact that steps will be taken to improve (I assume reduce) the emission and noise/sound standards, however, I believe 2008 or 2009-10 or 11 years is too long of a time for this change to take place.
SUMMARY RESPONSE: Experience in the automotive industry has shown that industry needs a number of years to phase-in new, lower emitting technologies.
COMMENT: "Page 2, Table 1, Snowmobile emission factors: It is inappropriate to, average all these emission factors due to the differences in test procedures and availability of products. For example, line item 8 lists SWRI 1998 Polaris emissions using aliphatic gasoline. This fuel is a specialty chemical in the United States costing about $3.50 to $4.00 per gallon (before taxes). The fuel type was added by SWRI in cooperation with some European countries. Aliphatic gasoline has no oxygenates, olefins, and virtually no sulfur or aromatics. Its purpose is to reduce carcinogenic exposures of operators (such as in the German forest products industry). The fuel is not suited to use in these two-stroke engines, and was found to increase ALL emissions but carcinogenic compounds. It would never be used in sleds in this country, and as a result of this testing, will not be used in Sweden or Germany either." See Montana DEQ Comments.
RESPONSE: The NPS is aware of the limited test data and test conditions, including fuel type. No decisions have been made on the basis of one set of emission tests.
COMMENT: "Page 8, last paragraph, "...4-hour exposure...." The paragraph uses the exposure samples in an incorrect manner, It is inappropriate to compare, a 4-hour exposure with an 8-hour standard. To properly compare the sample with the standard, the assumption must be made that this was the exposure for the entire shift, and divide the sample amount by the total hours of the shift. Comparisons in the revised draft final from Kado et al. should be used. The samples were taken during the times of highest exposure. They show a need for a follow-up study, and a possible need to move employees between jobs and exposure levels during a shift. They do not show that a standard has been exceeded or approached, which is what these statements imply." See Montana DEQ Comments.
RESPONSE: All data, including those reported by Kado, et al., will be reviewed for the FEIS.
COMMENT: The emissions issue of snowmobiles is vastly overstated. What about all the pollutants from diesel trucks?
RESPONSE: Reported measurements taken at the west entrance or other locations are not purported to be representative of air quality levels at all park locations at all times. The population of diesel trucks operating in the park in the winter is minor compared to the snowmobile population
COMMENT: The emission issue is very misleading, if not downright untrue. Reading (sic) are taken at the gate and accepted as being the norm throughout the park. How about a reading at the gate at (?) O'clock in the evening. The reading then would be zero, as it would be throughout most of a 24 hour period. The emissions in Los Angeles do not go to zero in the evening. How about taking a reading several hundred yards from the trail at the gate? The Reading s (sic) there would be much lower.

PUBLIC HEALTH
RESPONSE: Wyoming Department of Environmental Quality (DEQ) personnel have been involved since before the EIS was undertaken in planning and implementation of air studies in YNP. The Wyoming DEQ was not actively involved, and no input was received from them prior to publishing the DEIS.
COMMENT: I have contacted Dennis Hemmer, Wyoming DEQ Director, and this state would be willing to participate in an air quality study in the area. It would be necessary to obtain any funding from the Federal Government for this study. The new air study could be used to amend the Winter Use EIS at some future date.
RESPONSE: The Wyoming Department of Environmental Quality is the regulatory authority for some aspects of the Clean Air Act, delegated to it by U.S. EPA. The NPS has explicit authority over resources and their management on public lands in their jurisdiction. This includes air and air quality related values. The NPS has the assertive responsibility under the Clean Air Act to protect air quality (and related values) in Class I airsheds. It has the authority to undertake management actions intended to meet that need, as an entirely separate issue from national ambient air quality standards and state regulatory processes. New air dispersion modeling has been undertaken since the publication of the DEIS, and its findings will be incorporated into the FEIS.
COMMENT: First, EPA concludes that Alternatives A through F do not assure compliance with National Ambient Air Quality Standards (NAAQS) with respect to carbon monoxide (CO). The standard for CO is based on protection of human health. Despite data indicating existing significant impacts from CO in the Parks, this DEIS defers the decision on reducing human exposure to high CO levels in the Parks through "adaptive management" and through OHV emission controls that would not take effect until at least 2008. The NPS has available management tools that could address these impacts through this actions including limiting numbers and density of OHVs in the Parks, and it is not clear why these or other measures are not being proposed in the preferred alternative.
RESPONSE: The preferred alternative is not a decision. It is an indication of the direction that the NPS was leaning at the time of the DEIS and prior to public comment and final analysis. In fact, the preferred alternative is changing in the FEIS. Other alternatives in the EIS contain features that address issues within different time frames, as in the new preferred Alternative G.
Assumptions in Analysis (Public Health - Snowmobile Emissions Exposure)
COMMENT: Air quality is identified as a problem needing attention, yet overall air quality is generally good and air quality standards are occasionally exceeded only on high use snowmobile days (Pg. 94).
RESPONSE: Exceedances of air quality standards are not acceptable in a Class I park.
COMMENT: USGS 99-4148 document, the "Conclusions" under paragraph I, last two sentences, lines 19 thru 27, "These chemical data establish important baselines…related to gasoline combustion." This clearly demonstrates that snowmobiles have minimal pollution impacts.
RESPONSE: The reported conclusion does not demonstrate that snowmobiles have minimal impacts.
COMMENTS: In 1998 the monitor at the gate had the highest carbon monoxide spike in the entire US for the entire year. But before you take aim on snowmobiles for this, note that that spike occurred in October, not a snowmobile in the entire valley was running. That area is already prone to emission concentrations

PUBLIC HEALTH
SUMMARY RESPONSE: Comment does not provide data, and the NPS is unaware of any data indicating that a carbon monoxide spike was the highest carbon monoxide ambient concentration measured in the entire US for 1998.
COMMENT: The staging area for snowmobiles would move from West Yellowstone to Madison and Old Faithful. Isn't this just moving the pollution problem from the entrance to the interior of the park?
RESPONSE: No alternative in the DEIS recommends moving staging areas. Public access would be available to Madison and Old Faithful from West Yellowstone primarily by mass transit vehicle. People would not be trailering snowmobiles to those destinations.
COMMENT: For air quality concerns, an unstated assumption regarding the West Entrance to Yellowstone National Park is that the current entrance kiosk and method of admittance to the Park will remain unchanged. This assumption needs to be challenged because the location, configuration, and operation of the station contribute significantly to poor air quality at the site. Research in early 1999 shows that emissions levels are highest at the west entrance. Emissions levels are reduced to about 25 percent of this high at Madison Junction and Old Faithful (where more snowmobiles were operating), and emissions are even lower a kilometer west of the entrance, and lowest at a West Yellowstone residential site about two kilometers from the west entrance (Kado et al. 1999).
RESPONSE: The NPS is aware of the data cited in the comment and is considering possible changes in kiosk operations.
Clarification (Public Health - Snowmobile Emissions Exposure)
COMMENT: First, photos that show a snowmobile idling in the winter shows the "smoke" that it creates. Please make note that the majority is condensation seen only when it is cold.
RESPONSE: Yes, cold engines generate visible water vapor, as well as air pollutants.
COMMENT: What is all this information in the EIS on emissions? I thought EPA regulated emissions.
RESPONSE: EPA has regulated emissions from highway motor vehicle since the 1970s. However, EPA did not regulate emissions from nonroad engines until the mid-1990s. Standards exist for new engines used in construction, farm, lawn and garden equipment, marine vessels, and locomotives. However, there are no standards for snowmobiles to date. EPA anticipates promulgating standards for snowmobiles in late 2000.
COMMENT: I wonder why two government agencies (NPS and EPA) have not worked out a good working plan for emission standards.
RESPONSE: EPA has primary authority and is the lead authority on setting emission standards for mobile source engines.

PUBLIC HEALTH
COMMENT: Question studies on emissions. Want to see data and who performed tests.
RESPONSE: Engine emission test data can be found in several of the DEIS references, including J. White and J. Carroll. Data related to exposure to emissions from snowmobiles can be found in DEIS references such as L. Snook, Bishop and Stedman, and National Park Service, 1996b.
COMMENT: Restrict motorhomes, motorcycles, buses, pickup trucks as they must cause as much pollution as snowmobiles.
RESPONSE: Currently, snowmobiles are the dominant population of mobile sources in the wintertime in the park. Although other vehicle types produce emissions, they are not the subjects of study in this analysis, nor have they specifically been identified as of concern during other seasons.
COMMENT: Then why allow them [snowmobiles] in the park at all, or is the goal just to lesson (sic) the pollution by cutting down the numbers? If so, why from just West Yellowstone?
RESPONSE: Snowmobiles have been operating in the park for several decades. One purpose of the Winter Use Plan DEIS is to address snowmobile and air quality issues.
COMMENT: Is the pollution (sic) creating area health threat to either the humans or the wildlife?
RESPONSE: The DEIS outlines published studies on health issues in the park in the winter.
COMMENT: Why is there so little "understanding" of the air quality and resource impacts of snowmobile emissions of the typical duty cycle of a snowmobile? We believe that an analysis of the emission load of summer use and pre-1970 automobiles offers a scientific perspective for today's winter use.
RESPONSE: There are few snowmobile engine emissions data, and comparisons to pre-1970 automobiles and current snowmobiles are not viable. Pre-1970 autos were 4-stroke engines operating on leaded gasoline, while snowmobile engines are 2-stroke engines operating on unleaded gasoline.
COMMENT: I assume that the reference to wood smoke in the staging area refers to that created by fireplaces and wood burning stoves in Jackson. This should be more clearly stated.
RESPONSE: For purposes of this Winter Use Plan, woodstove and fireplace emissions are generally of interest in the town of West Yellowstone, not Jackson.
COMMENT: What is the probability that standards can be met by the timeframe you have designated? And if standards cannot be met, will the implementation date be pushed out farther or will the Park implement immediate checkpoints and prohibit snowmobiles which are out of compliance from entering the park?
RESPONSE: The NPS is not in a position to estimate probabilities of snowmobile manufacturers in meeting standards in the proposed timeframe.

PUBLIC HEALTH
Clarification (Public Health – Automobile and Bus Emissions Exposure)
COMMENT: You can't tell me that tour busses run cleaner than snowmobiles.
RESPONSE: Emissions from new tour bus engines are regulated by EPA, but snowmobile engines are not.
SUMMARY COMMENT: The NPS needs to address pollution from exhaust associated with snowplows, automobiles and busses. These sources will have significant public health impacts.
SUMMARY RESPONSE: Additional air quality analyses related to alternatives involving autos, buses and trucks are being conducted for the FEIS.
COMMENT: Media attention focuses around snowmobiles and the pollutants they supposedly put into the air, but what about the thousands and thousands of stinky tour busses and automobiles that drive bumper to bumper around the parks in the summer months?
RESPONSE: The Winter Use Plan DEIS focuses on winter visitation only. Although other vehicle types produce emissions, they are not the subjects of study in this analysis, nor have they specifically been identified as of concern during other seasons.
COMMENT: Busses currently operating in the Park frequently abuse national emissions and sound standards.
RESPONSE: Currently, buses do not operate in most of the park in the winter, and the Winter Use Plan DEIS focuses on winter visitation only.
SUMMARY COMMENT: Air pollution levels by buses parked and idling at Old Faithful would be higher than the pollution created by snowmobiles.
SUMMARY RESPONSE: All tour bus operators receive written instructions when they enter the park that buses are not permitted to idle unless they are loading, unloading, or warming up.
Clarification (Public Health – Snowcoach Emissions Exposure)
COMMENTS: Multipassenger snowcoaches, which certainly produce much less pollution per passenger than do snowmobiles. What would the daily air pollution in Yellowstone from this many coaches be?
SUMMARY RESPONSE: Additional air quality analyses that relate to alternatives involving snowcoaches are being conducted for the FEIS.
COMMENT: The existing snow coach fleets operated by commercial vendors should be inspected for emissions and required to meet certain standards.

PUBLIC HEALTH
RESPONSE: The NPS is not and will not be equipped to conduct a snowcoach emission inspection program at the park entrances. However, snowcoaches operated by licensed concessionaires will meet EPA emission standards for the class of vehicle engine that powers the snowcoach.
Methods (Public Health – Snowcoach Emissions Exposure)
SUMMARY COMMENT: How can 2000 snowmobiles leave so many tons of emissions? The vehicle emissions violations at the West Entrance station cannot be completely accurate. The monitoring system used is located under the eve of the building, and idling snowmobiles are parked 5 feet away. This definitely does not fit the mode of scientific based research.
SUMMARY RESPONSE: Most recent engineering and scientific data were used in context of time and resources available. Additional technical analyses (e.g., air dispersion modeling) are to be included in the FEIS.
COMMENTS: My feelings are that the studies were conducted with variables, which are not standard conditions. You claim that as many as 2,000 snowmobiles enter the park in one day and emit as much as 100 tons of emissions into the air. Simple arithmetic will show this to be way off the mark. If 2,000 snowmobiles use about 7 gallons of gas and oil (on average) in one day, this would (at approx. 7.5 pounds per gallons) weigh 15,000 pounds or 7.5 tons. When you consider that at least 80% of the gas is burned, that leaves only 1.5 tons of emissions at worst case. And that is only on peak days!
SUMMARY RESPONSE: The weight of combustion gases created from combusting fossil fuels is not equal to the weight of the fuel. Annual emissions are calculated using emission factors (grams/mile for snowmobiles in motion and grams/hour for idling snowmobiles) that are applied to estimated miles traveled and estimated idling times during the winter season.
General (Public Health and Snowmobile Emissions Exposure)
SUMMARY COMMENT: The typical snowmobile uses a two-stroke engine that produces high emissions of carbon monoxide (CO), unburned hydrocarbons (UHC), particulate material and a variety of gases classified as "air toxics" such as formaldehyde, and VOCs such as benzene. Snowmobiles don't use any pollution control equipment. The emissions are significantly higher than present-day automobiles and can concentrate in areas having cold and stable air.
SUMMARY RESPONSE: The DEIS acknowledges that there are relatively high emissions associated with two-stroke engines compared to four-stroke engines.
COMMENTS: Exposure to air pollutants, such as those listed above, is associated with numerous effects on human health. Those effects range from impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks to headaches, fatigue, respiratory failure, and even death. Health concerns that are most commonly raised within the Park are related to smoke and vehicle emissions. Over 1200 letters of complaint were received by YNP in 1993 and 1994 relating to issues of employee and visitor health and excessive snowmobile pollution.

PUBLIC HEALTH
Snowmobiles damage visitor and employee health.
SUMMARY RESPONSE: The DEIS cites over 1,200 visitor complaint letters received in 1993-94 relating to snowmobile emissions and results of preliminary carbon monoxide sampling conducted in 1996 that raised health concerns.
COMMENT: Bombardier snowcoaches with emissions that are similar to those of light trucks manufactured prior to 1970 (very high HC and 1,000 gm/mile CO).
RESPONSE: Older snowcoaches are likely to have emissions that are very much higher than modern day light-duty vehicle engines.
COMMENT: "Page 9, paragraph 3, first sentence “dangerously high.” What standard is NPS using to determine that these levels are "dangerously high?" Please remove the word dangerously or cite the corresponding standard used. We agree that employees and visitor exposure needs to be minimized, however, more study is needed before these levels can be categorized as dangerous. Further, the paragraph implies that removal of high levels of snowmobile emissions would resolve all the problems, which is false. The problem really is a high amount of pollution trapped in an area with poor dispersion characteristics. This usually occurs with automobiles and trucks in congested areas. NPS can reduce congestion in certain areas to reduce exposure, and or relocate congestion of winter traffic to areas with better air flow and emission dispersion characteristics."
RESPONSE: Modifiers such as “dangerously high” will be used only when supported by empirical data. Most recent engineering and scientific data were used in context of time and resources available for the DEIS. Additional technical analyses (e.g., air dispersion modeling) are to be included in the FEIS.
COMMENT: There is every indication that visitation levels will increase. Since this is indicated in the discussion of the impacts of some of the other topics, it should be indicated here too.
RESPONSE: Measures directed at air quality and visitation increases generally apply to the issue of public health.
COMMENTS: Page 202, paragraph 1, first sentence: The word "snowmobile" should be changed to over-snow vehicle" emissions because all vehicle emissions will be effected. DEQ estimates that CO vehicle emissions would be reduced by about 15 percent of those in Alternative A. The effect of this reduction would be seen in DEQ's evaluation of the estimated worse-case 1 hour CO levels for the West Entrance. For this evaluation, DEQ used information on Alternative B using data from paragraph 2 and pages 217 and 218. The CO level would be about 16 to 22 percent of the CO level in Alternative A for the West Entrance of the Park (Table 1, Cain et al. 1999). It is not the lowest level derived from modeling the alternatives-that would result from either Alternative F, closing the roads, or an alternative based on the exclusive use of electric snowmobiles mentioned on page 208 (alternative fuels), either of which would produce negligible emissions at the West Entrance.
Page 225, first paragraph: Alternative C is better for air quality than Alternative B. It is not the same as indicated in this paragraph. DEQ estimates that Alternative C would reduce CO emissions from vehicles by about 12 percent. DEQ's analysis and professional review of the 1-hour peak CO level for a worse case scenario at the West Entrance under Alternative C is about 16 to 20 percent of the CO levels estimated in Alternative A.
SUMMARY RESPONSE: Additional air dispersion modeling for carbon monoxide for all alternatives will be included in the FEIS.

PUBLIC HEALTH
Negative Effect (Snowmobiles on Public Health)
SUMMARY COMMENT: The preferred alternative should prohibit recreational snowmobile activity because such activity causes damage to […], public safety and health.
SUMMARY RESPONSE: Impacts of winter recreation and related actions are disclosed in the DEIS. In some instances, the modeling of air quality will provide greater quantification of some impacts, by alternative, in the FEIS.
Positive Effect (Banning Snowmobiles on Public Health)
COMMENT: In doing so, you would not only protect the wildlife and our truly beautiful and spectacular natural resources but also improve the health of our people.
RESPONSE: Impacts of winter recreation and related actions are disclosed in the DEIS. In some instances, the modeling of air quality will provide greater quantification of some impacts, by alternative, in the FEIS.
No Effect (Snowmobiles on Pubic Health)
COMMENT: Snowmobiles do not cause damage to park resources, […], public safety and health, and […].
RESPONSE: Impacts of winter recreation and related actions are disclosed in the DEIS. In some instances, the modeling of air quality will provide greater quantification of some impacts, by alternative, in the FEIS.